

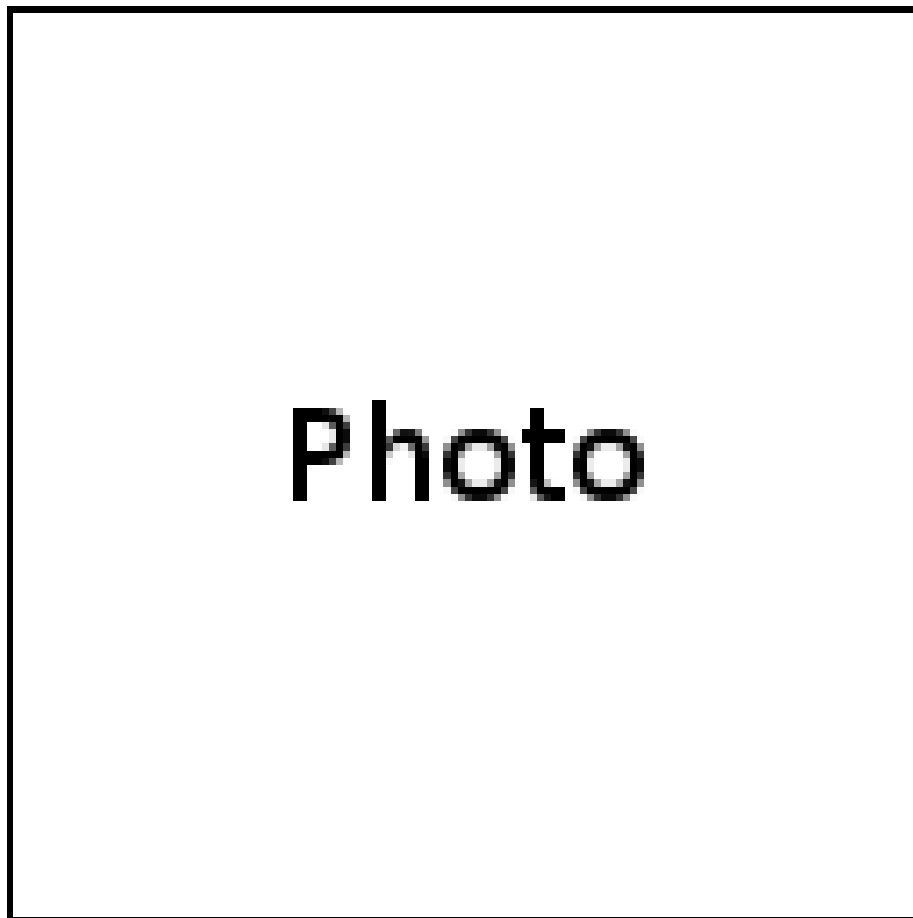
# Twibright Distillcooker

**Combined drinking water distiller and thermostat cooker**

For building by laymen consumers in rich and poor countries

by Karel Kulhavý, twibright@bluewin.ch

Please donate to IBAN CH51 0070 0113 7000 6508 1, Zürcher Kantonalbank



Revision 24. June 2014

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## 1 Abstract

- Water distiller combined with a thermostat cooker
- Can be built by a layman in 37 minutes, for material cost of \$15.
- From upcycled trash and material easy to get worldwide, reuses items already present in household without modifications – these can be still normally used.
- Extremely high water quality, removes almost everything: infections, hormones, toxic metals, toxic anions, organic pollutants and chlorination byproducts. Safety of drinking distilled water proven by detailed analysis and dietary recommendation.
- Cooking generates byproduct of 1.3 L distilled water per person and day at a cost of \$0.07/liter. More distilled water can be generated at a cost of \$0.25/liter.
- 8-9 times more energy efficient than ordinary distiller (theoretical).
- No scorching of food, no boiling over even when left indefinitely without attendance. Better preservation of tastes.
- Cooking functions: reheating food, rice cooker, simmering, making tea, boiling drinking water over, double boiling cooking method, double steaming cooking method, boiling down liquids, drying, melting, heating water for bathing,
- Building and sale freely allowed under the Creative Commons CC-BY-SA licence, no payment or registration needed, small and lightweight package for shipping.
- Developed by Karel Kulhavý of Twibright Labs with 16 years of experience, 3 scientific articles, 26 citations, and 2000 installations of a major product in the area of freely published DIY manufacturing technology.
- Can produce emergency drinking water from urine.



## 2.A.3 Cooking functions

### 2.A.3.1 Heating food up

- Making tea
- Heating water for washing dishes or bathing
- Disinfecting drinking water by simmering. Distilled water is produced XXXXXXXXXXXXXXXX at the same time.
- Reheating food without attendance

### 2.A.3.2 Cooking

- Rice cooker. Without attendance. Like the usual electric one.
- Simmering closed at 93-96 °C – soups, potatoes etc.
- Simmering open at 90-93 °C – soups etc.
- Cooking thick sauces without attendance without them spitting around the kitchen
- Double steaming cooking method
- Baine marie, water bath or double boiling cooking method

### 2.A.3.3 Boiling down liquids

- Making sugar from sugar cane juice without attendance
- Boiling down fruit juices for jams without attendance
- Making salt from seawater
- Drying aqueous herbal extracts into powders. Not suitable for alcohol extracts – risk of explosion

### 2.A.3.4 Melting

- Thawing frozen foods without attendance
- Melting butter or chocolate without attendance
- Preparing fondue without attendance (melting cheese)
- Melting candle butts to make new candles without attendance and without fire hazard

### 2.A.3.5 Drying solids

- Drying herbs without attendance
- Drying small clothes like socks, gloves, underwear without attendance

### 2.A.3.6 No cooking use

- Water can be distilled without using the cooking compartment for anything





Pollutant class	Pollutants removed	Health effects
All infectious agents	Bacteria and their spores, viruses, fungi, protozoa, microscopic parasites, prions	Death, polio, infertility, bladder cancer, neurologic symptoms, liver damage, kidney failure, liver enlargement, jaundice, severe weight loss, fever, underdevelopment, vomiting, explosive diarrhoea, diarrhoea, hyperactivity
Hormones	All	Fertility and sperm quality reduction, man boobs
Toxic metals	Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Nickel, Mercury, Plutonium, Radium, Selenium, Thallium, Uranium	Cancer, radioactive, toxic, accumulates
Toxic anions	Nitrates, Nitrites, Cyanide, Fluoride	Cancer. In high levels: nerve damage, thyroid problems (cyanide), pain, bone and joint damage, stains and pits in tooth enamel (fluoride)
Organic pollutants	Alachlor, Benzo(a)pyrene, Carbofuran, Chlordane, Dalapon, 2,4-D, di(2-ethylhexyl) adipate, di(2-ethylhexyl) phthalate, Dinoseb, Dioxin, Diquat, Endothall, Endrin, Ethylbenzene, Ethylene dibromide, Glyphosate (Roundup), Heptachlor, Heptachlor epoxide, Hexachlorobenzene, Lindane, Methoxychlor, Oxamyl, Pentachlorophenol, Picloram, Polychlorinated Biphenyls (PCB), Simazine, Toxaphene, 2,4,5-TP	In level exceeding limits: Liver damage, liver enlargement, cataracts, immune deficiencies, weight loss, anemia, increased risk of cancer, changes in the skin, problems with eyes, kidneys, spleen, blood, nervous system, reproductive system, adrenal glands, stomach, intestines, thymus gland
Chlorination and disinfection byproducts	Chloroacetic acids, iodoacetic acid, bromoacetic acid, chlorite, trichloromethane, triiodomethane, tribromomethane	In level exceeding limits: cancer, anemia, liver, kidney, central nervous system problems.
Smells and tastes	Virtually all	Usually harmless

### 2.A.4.2 Drinking water production rate

#### 2.A.4.2.1 Device limitation

XXXXXXXXXXXXXXXXXXXX	XXXXXXX
Amount of distilled water per liter of water heated up from 10 °C to 96 °C	0.1X L
Amount of distilled water per liter of heated up from 25 °C to 96 °C	0.1X L
Amount of distilled water per kg of frozen food to thaw and bring to simmering	0.3X L
Amount of distilled water per kg of food reheated from 25 °C to 70 °C	0.08 L
Amount of distilled water per liter of water evaporated from the top compartment	0.6-1.2 L
<b>Example Distillcooker: XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX, glass-ceramic</b>	

<b>stove 18 cm diameter, nominal stove power 1.8 kW (user manual), net stove cooking power (into water) 0.92 kW, 400 m above sea</b>	
Distillation rate when water in cooking compartment is warming up XXXXXXXXXXXXXXXX	1.X L/h
Distillation rate when water in open cooking compartment is at maximum temperature	0.3X L/h

**2.A.4.2.2 Cooking limitation**

Per person and day model case:

<b>Land</b>	Cambodia	Switzerland
<b>Distilled watter produced per person and day</b>	1.3X L	1.2X L

**2.A.4.2.3 XXX**

XX XX	XXXXX
XX XX XXX	XXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XX

**2.A.5 Cost**

**2.A.5.1 Manufacturing cost**

**2.A.5.1.1 Money**

Item	Worldwide available (Ebay, IKEA, etc.) [USD]	Switzerland [USD]	Cambodia [USD]	Min. [USD]	Average [USD]	Max. [USD]
XXXXXXXXXXXX	XXXXX	XXXXX		XXXXX	XXXXX	XXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
XXXXXXXXXXXXXXXXXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
<b>Material total</b>	<b>\$16.23</b>	<b>\$16.20</b>		<b>\$11.53</b>	<b>\$14.72</b>	<b>\$16.44</b>
XXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXX	XXXXX	XXXXX		XXXXX	XXXXX	XXXXX
XXXXXXXXXXXXXXXXXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXX	XXXXX		XXXXX	XXXXX	XXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
<b>Trash replacement total</b>	<b>\$6.67</b>	<b>\$6.41</b>		<b>\$4.88</b>	<b>\$7.96</b>	<b>\$12.18</b>

Item	Worldwide available (Ebay, IKEA, etc.) [USD]	Switzerland [USD]	Cambodia [USD]	Min. [USD]	Average [USD]	Max. [USD]
XXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
XXXXXXXXXXXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
XXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
XXXXXXXXXXXXXX	XXXXX	XXXXX		XXXXX	XXXXX	XXXXX
<b>Household items used without modification and being still reusable total</b>	<b>\$17.97</b>	<b>\$30.07</b>		<b>\$14.98</b>	<b>\$23.52</b>	<b>\$30.07</b>
XXXXXXXXXXXXXXXXXXXXX	XXXXX	XXXXX		XXXXX	XXXXX	XXXXX
XXXXXXXXXXXXXXXXXXXXX	XXXXX	XXXXX		XXXXX	XXXXX	XXXXX
<b>Tools total</b>	<b>\$5.54</b>	<b>\$11.98</b>		<b>\$5.45</b>	<b>\$8.72</b>	<b>\$11.98</b>
<b>Total</b>		<b>\$64.66</b>		<b>\$36.84</b>	<b>\$54.92</b>	<b>\$70.67</b>

**2.A.5.1.2 Time**

Work	mm:ss
Preparation	14:33
XXXXXXXXXXXXXXXXXXXXX	12:07
XXXXXXXXXXXXXXXXXXXXX	2:20
Assembling the XXXXXXXXXXXXXXXX	2:33
Making the XXXXXXXXXXXXXXXX	5:15
<b>Total</b>	<b>36:48</b>

**2.A.5.2 Operating cost**

**2.A.5.2.1 Money**

Includes cost for XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX and replacing water minerals by nutrition

Heating method	Cambodia charcoal	Cambodia gas stove with tank	Phnom Penh electric	Switzerland glass ceramic electric
<b>Cost of m<sup>3</sup> distilled water when cooking</b>	\$54.03	\$75.45	\$80.08	\$86.12
<b>Cost of m<sup>3</sup> distilled water when not cooking</b>	\$117.52	\$292.95	\$330.83	\$273.95
<b>Cost of m<sup>3</sup> bottled water</b>	\$333.00	\$333.00	\$333.00	\$161.11

### 2.A.5.2.2 Time

XX  
XX

Operation	Time	Comparison device	Comparable time
XXXXXXXXXXXXX	XXXXX	XXXXX	XXXXX
XXXXXXXXXX	XXXXX		
Cook rice	47 min	Rice cooker	32 min
Heat up food from fridge	12 min	Microwave	3 min

### 2.A.6 Suitable heat sources

- Any cooking stove: wood, gas, electric, electric with ceramic plate, induction
- Thai/Cambodia style charcoal cooker on firm horizontal surface
- Portable gas stove on firm horizontal surface
- Camp fire with suitable firm horizontal metal grate
- Any heat source must provide a stable horizontal surface of enough diameter to prevent Distillcooker from toppling. Danger of boiling liquid splashing and causing burns.
- Not usable at all: ovens, including microwave

### 2.A.7 Appearance

Distillcooker  
XX  
XX  
XX

XXX for cooking and can be used open or closed.  
XXX  
XXX

#### 2.A.7.1 XXXXXXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

XXXXXX	XXXXX
XXXXX	XXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXX
XXXXXXXXXXXXX	XXXXXX

#### 2.A.7.2 XXXXXXXXXXXXX dimensions

Typical medium size unit. Accessories – XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX – not counted.

Height	2X cm
Width	2X cm

Depth	2X cm
Empty weight, ready to use	1.X kg
Full weight	3.X kg

**2.B Origin**

Twibright Distillcooker is developed by Karel Kulhavy of Twibright Labs. The home page is in the physical products section of Twibright Labs, <http://twibright.com>

**2.C Distribution to the consumer**

**2.C.1.1 Consumer building directly**

The final product of Twibright Labs is a technology in form of building instructions meant for building by a layman. These are available free of charge and without registration on the Internet under a CC-BY-SA license.

The cost, complexity and necessary tools are kept to a convenient minimum obtainable widely worldwide.

When the consumer decides to get the device, he is expected to build himself without needing any special knowledge. The device should be reliable and work on the first try.

Consumer may decide to send donations to support further developments of Twibright Labs on this or other projects. Please donate to *IBAN CH51 0070 0113 7000 6508 1*, Zürcher Kantonalbank.

**2.C.1.2 Consumer ordering from a third party webshop**

Entrepreneurs are welcome to exploit the freely available technology commercially for their own profit. They don't need to ask for a permission or pay any royalties. They are welcome to sell material and tools for the manufacture, manufacture important parts or whole kits and sell them locally or worldwide. For example using a webshop or auction platform.

These entrepreneurs may decide to send donations to support further developments of Twibright Labs on this or other projects. Please donate to *IBAN CH51 0070 0113 7000 6508 1*, Zürcher Kantonalbank.

**2.C.1.2.1 Shipping dimensions**

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX	XXXXX
XXXXXXXXXXXXXXXXXXXX shipping height	28 cm
XXXXXXXXXXXXXXXXXXXX shipping width	8.5 cm
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXX
XXXXXXXXXXXXXXXXXXXX shipping height	8 cm
XXXXXXXXXXXXXXXXXXXX shipping width	10 cm

<b>Total shipping weight, without XXXXXXXXXXXXXXXXXXXX</b>	<b>260 g</b>
<b>Total shipping weight, with XXXXXXXXXXXXXXXXXXXX</b>	<b>510 g</b>

### **2.C.1.3 Consumers participating in local production**

If a group of consumers is interested in the product, they may participate in building as neighbours or friends. They may split the task so that each does a specific type of work.

## **2.D Consumer support**

During manufacture, usage or repair of the product following situations may arise where support can be helpful:

- Instructions are ambiguous, contradictory, or incompletely covering
- Material or tool is not available
- The product is defective
- Recovery from human error is needed
- Suggestion for improvement
- General questions or discussion about the product

The following support channels are available:

- IRC chat, both web based and standalone. Click support on the Twibright Labs homepage <http://twibright.com>
- The product webpage is at Twibright Labs <http://twibright.com> in the list of physical products
- Author e-mail [twibright@bluewin.ch](mailto:twibright@bluewin.ch)

### 3 Test results

#### 3.A Water quality

##### 3.A.1 Usage according to the instructions

Source	Source quality	Place	Date source water	Who	XXX X XXX XXX	Test method	Result
River Sihl and Limmat	Sihl disgusting, Limmat OK	Zürich CH	25. Apr. 2014	Twibright Labs	XXXX	Store 4 days in glass bottles with Al foil cover, then make peppermint tea	Better taste than made from tap water
River Sihl and Limmat	Sihl disgusting, Limmat OK	Zürich CH	25. Apr. 2014	Twibright Labs	XXXX	Store 4 days in glass bottles with Al foil cover, then taste room temperature	No taste
River Sihl	Disgusting. Raw water medium strong sewer smell	Zürich CH	25. Apr. 2014	Twibright Labs	XXXX	Taste immediately warm and then room temperature	Slight sweet plastic taste
Tap water	High, no taste. XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX X	Zürich CH	25. Apr. 2014	Twibright Labs	XXXX	Taste immediately warm and then room temperature	Slight metallic and acidic taste
River Limmat	OK, visible blue-greenish colour and organic clumps floating within the body of water	Zürich CH	25. Apr. 2014	Twibright Labs	XXXX	Taste immediately warm and then room temperature	First tasting very slight taste, next 3 tastes of the same cup (more cooled down) absolutely no taste
Tap water	High, no taste	Zürich CH	7. May 2014	Twibright Labs	XXXX	Put multivitamin effervescent tablet in	Tastes great, much better than from tap water
Urine	Yellow	Zürich CH	10. May 2014	Twibright Labs	XXXX	Cool down, taste	Noticeable sour and sometimes also slight metallic taste. Otherwise no negative tastes. Drank it all! :)

### 3.A.2 Usage against the instructions

Source	Source quality	Place	Date source water	Who	XXX X XXX XXX	Test method	Result
River Sihl	Disgusting. Raw water medium strong sewer smell	Zürich CH	25. Apr. 2014	Twibright Labs	XXXX	Taste immediately warm and then room temperature	Disgusting rivery, grassy and fishy taste. Tastes like the smell of a zoo! Weird sweet a bit floral odor. Want to spit it out!
Tap water	High, no taste	Zürich CH	25. Apr. 2014	Twibright Labs	XXXX	Taste immediately warm and then room temperature	Absolutely zero taste

### 3.B Rice cooking speed

Device	Filling	Cooking time
Rice cooker Sharp KSH-700 300W 19cm diameter	200 g long grain parboiled rice + 500 g cold tap water	<b>32 min</b>
Distillcooker XXXXXXXXXXXXXXXXXXXXXXXXX on glass ceramic plate	200 g long grain parboiled rice + 500 g cold tap water, XXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	<b>52 min</b> XXXXXXXXXXXXXXXXX XXXXXX XXXXXXXXXXXXXXXXX XXX XXXXXXXXXXXX 14X mL water produced

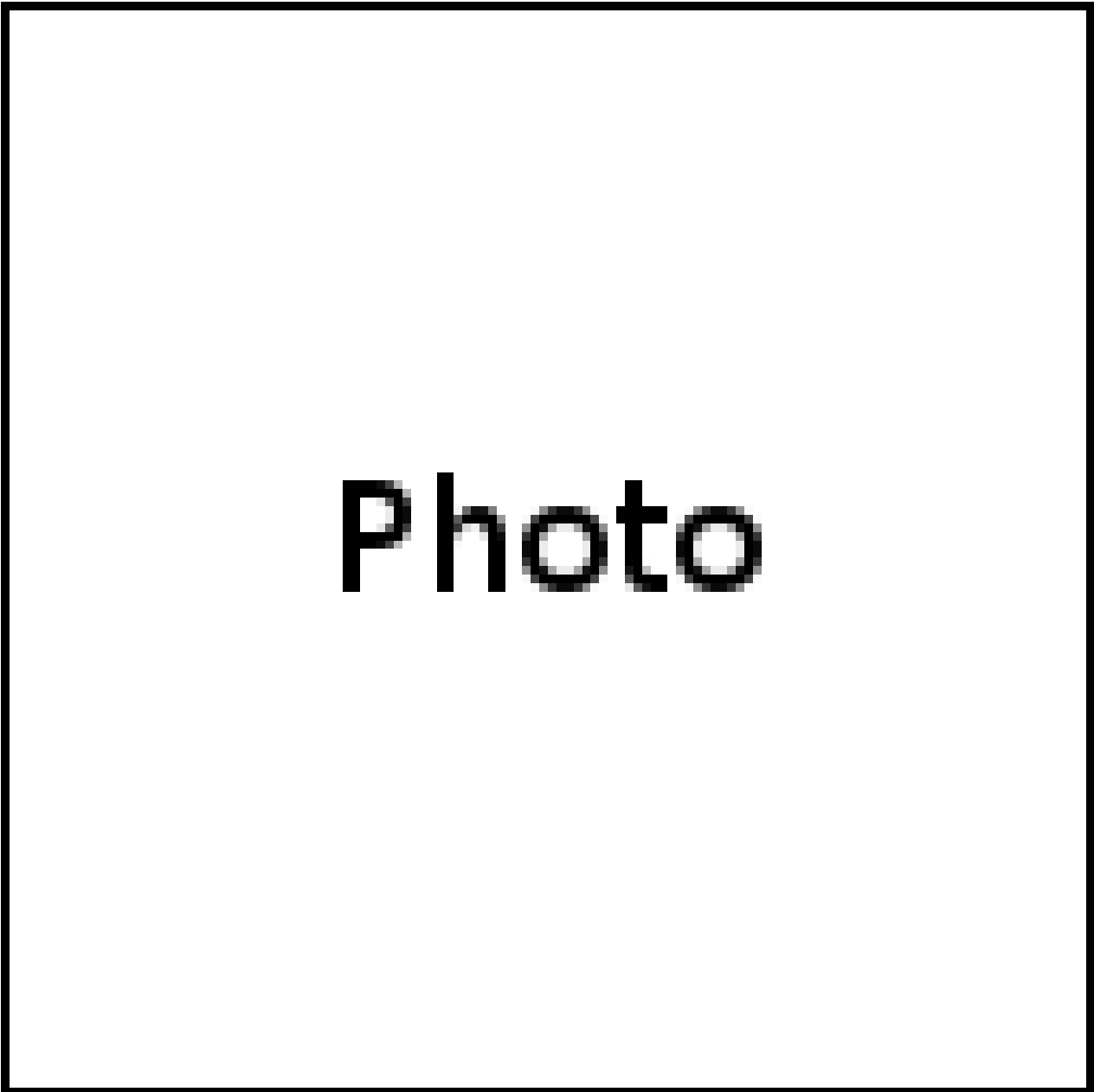
### 3.C Cooking tests

Food	Result	Who
Pineapple extra jam – 100% fruit juice from concentrate boiled down, no additional sugar or pectin	Good	Twibright Labs
Wine extra jam - just fruit juice boiled down, no additional sugar or pectin	Excellent	Twibright Labs
Cooking rice 2x	Excellent, better taste than from rice cooker	Twibright Labs
Heating up food 4x	Excellent. Absolutely no burning.	Twibright Labs
Simmering vegetable soup: celery, carrots, potato, onion, garlic, parsley, vegetable boiullon, salt, pepper, cumin, fish sauce	Excellent taste! Cooks somewhat slower, but the vegetables are more tasty, and have better texture, compared to ordinary pot.	Twibright Labs
Simmering soup: celery, carrots, onion, chicken boiullon	Excellent taste! This time cooking doesn't feel slower and vegetables are cooked soft without loosing their shape	Twibright Labs
Making tea from tap water and letting it cool down outside of the machine 2x	Excellent, like normal making tea	Twibright Labs



<b>Food</b>	<b>Result</b>	<b>Who</b>
Making tea from tap water and letting it cool down in the machine 12x	Good	Twibright Labs
Melting fondue (cheese) 2x	Excellent	Twibright Labs
Cooking lentils	Bad, seems to need a rolling boil in an open pot	Twibright Labs
Soup from 1-2 bouillon cubes and 2-3 eggs 2x	Delicious. No spilling, no sticking to the bottom, very little attention needed, as opposite to a normal pot.	Twibright Labs

## 4 Manufacture



### **4.A Get all the material and tools**

#### **4.A.1 Get the 1<sup>st</sup> batch of material and tools**

##### **4.A.1.1 XXXXXXXX**

```
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```



**4.A.1.1.1 Suitable and unsuitable XXXXXXXXXXXXXXXXXXXX**

<p style="text-align: center;"><b>Excellent</b> XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX</p>	<p style="text-align: center;"><b>Excellent</b> XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXX</p>	<p style="text-align: center;"><b>Excellent</b> XXXXXXXXXXXXXXXXXXXX XX XXXXXXXXXXXXXXXXXXXX</p>
<p><b>Photo</b></p>	<p><b>Photo</b></p>	<p><b>Photo</b></p>
<p><b>Photo</b></p>	<p><b>Photo</b></p>	<p><b>Photo</b></p>
		<p><b>Photo</b></p>

Image sources: "9.F Sources of images" page 62.

<p><b>Very good</b> XXXXXXXXXXXXXXXXXX</p>	<p><b>Good</b> XXXXXXXXXXXXXXXXXX</p>	<p><b>Unusable</b> XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXX</p>
<p>Photo</p>	<p>Photo</p>	<p>Photo</p>
<p>Photo</p>		<p>Photo</p>
		<p>Photo</p>
		<p>Photo</p>
		<p>Photo</p>

**4.A.1.2 Recommended kitchen accessories**

These are not part of Distillcooker but you may be interested in buying them at once.

Item	1st choice	2nd choice	Unusable	Source
Funnel	Stainless steel	Glass, plastic	Technical, contaminated	Kitchen, Kitchen store



### 4.A.1.3.1 Typical sizes of XXXXXXXXXXXXXXXXXXXXX

Sorted by XXXXXXXXXXXXXXXXXXXXX

XXXXXXXXXX	XXXXXXXXXXXXXXXX	XXXXXXXX XXXXXXXX	XXXXXXXXXX XXXXXX XXXXXXXXXX XXX	XXXXXXXX XXXXXXXXXX XX	XXXXXXXX XXXXXXXX
XXXXXXXXXXXXXXXXXXXX XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXXXXXXXXXXXX XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXXXXXXXXXXXX XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXXXXXXXXXXXX XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXXXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
XXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX

### 4.A.1.4 Consumables

Item	1st choice	2nd choice	Unusable	Source
XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
XXXXXXXX XXXXXXXX XXX	XXXXXX	XXXXXXXXXXXXXXXXXXXX	XXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXX

4.A.1.5 Tools

Item	1st choice	2nd choice	Unusable	Source
XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	XXXXX	XXXXXXXXXXXXXXXX	XXXX
XXXXXXXXXX	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXX XXXXXXXXXX
XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX X	XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXX XX		XXXXXXXXXXXXXXXXXXXX XXXXXX		XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXX XXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXX		XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX X
XXXXXXXXXXXXXXXXXX XX		XXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXX XXXXXX
XXXXXXXXXXXXXXXXXX XXX	XXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX X		XXXXXXXXXXXXXXXX XXXXXX
XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXX	XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX	
XXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX X		XXXXXXXXXXXXXXXX XX
XXXXXX	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX XXXXXXXXXX	XXXXXXXXXXXXXXXX XXXXXXXXXXXX
XXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXX		XXXX
XXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX X	XXXXXXXXXXXXXXXX X	XXXXXXXXXXXXXXXX XXXXXX
XXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXX	XXXXXX	XXXXXXXXXX		XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XX
XXXXXXXXXXXXXXXXXX X	XXXXXXXXXXXXXXXXXX X	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX XX	XXXX
XXXXXXXXXXXXXXXXXX XXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXX	XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX X	XXXXXXXXXXXXXXXX XX
XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXX	XXXXX	XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX XXXXXX



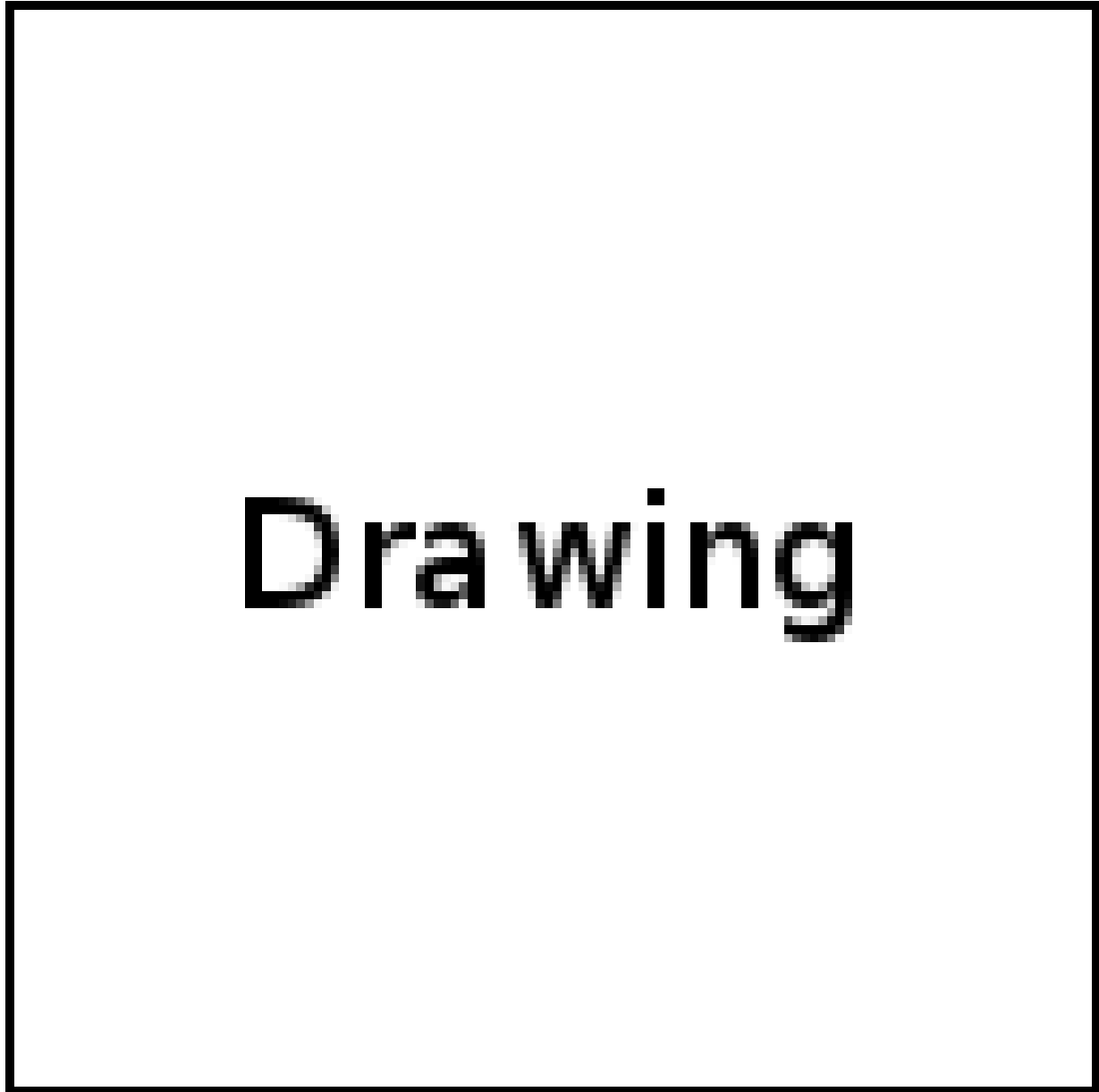
Item	1st choice	2nd choice	Unusable	Source
XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXX XXXXXXXXXXXXXX XXXXXXXXXXXX	XXXX

### 4.A.2 Calculate XXXXXXXXXXXX

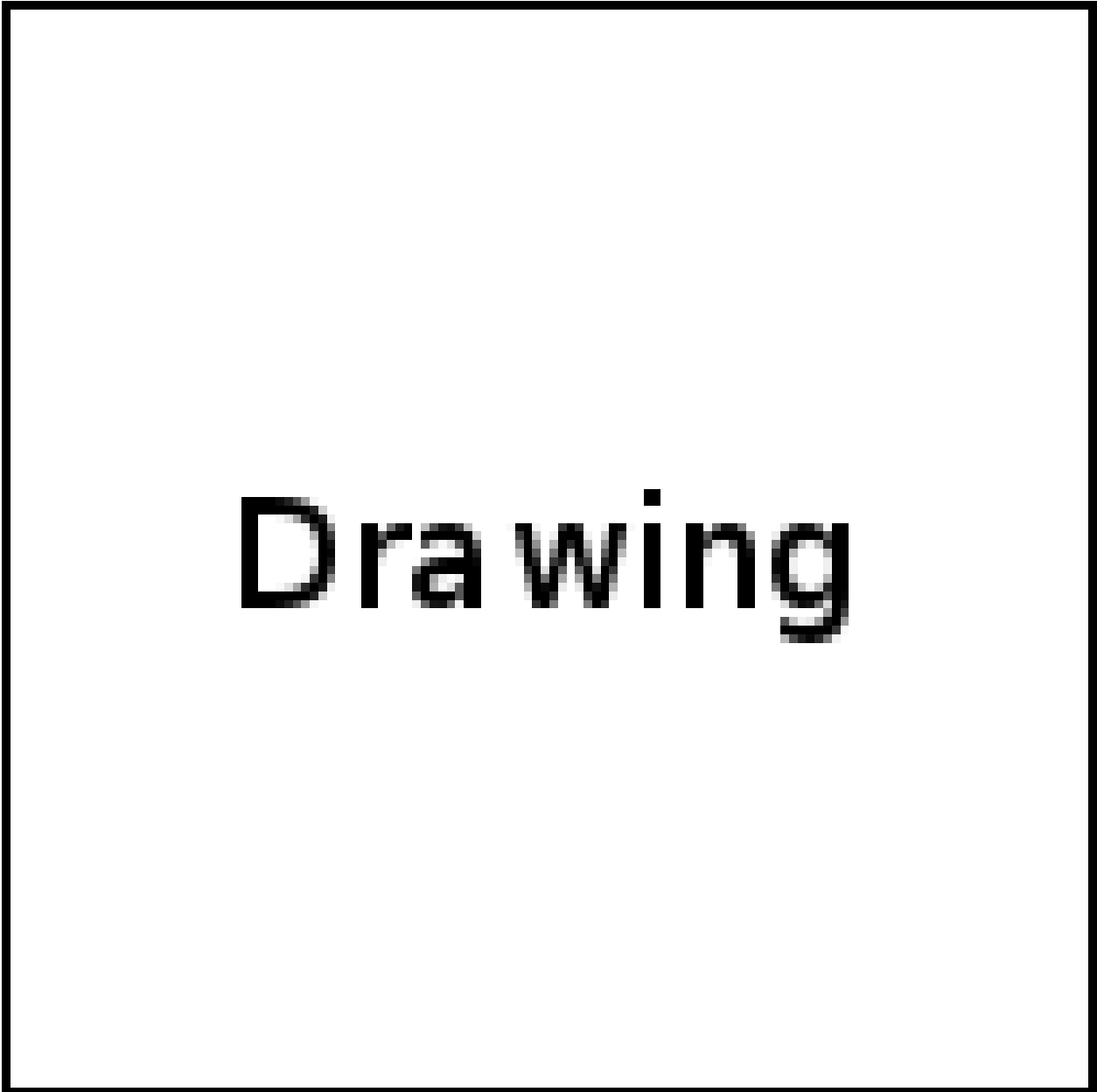
- a) Fill in the top row of  
XX  
XX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- b) Plug the resulting  
XX
- c) Fill in the rest of the top row of  
XX  
XX  
XXXXXXXXXXXXXXXXXXXX
- d) Fill in the empty rectangles using a calculator. If you don't have square root, use the table below.
- e) The results are in the bottom 2 rows.

Input	√	Input	√	Input	√	Input	√	Input	√	Input	√
225	15	529	23	961	31	1521	39	2209	47	3025	55
256	16	576	24	1024	32	1600	40	2304	48	3136	56
289	17	625	25	1089	33	1681	41	2401	49	3249	57
324	18	676	26	1156	34	1764	42	2500	50	3364	58
361	19	729	27	1225	35	1849	43	2601	51	3481	59
400	20	784	28	1296	36	1936	44	2704	52	3600	60
441	21	841	29	1369	37	2025	45	2809	53	3721	61
484	22	900	30	1444	38	2116	46	2916	54	3844	62

**4.A.2.1 XXXXXXXXXXXXXXXXXXXX diagram**



**4.A.2.2 XXXXXXXXXXXXXXXX diagram**



**4.A.2.3 Determine XXXXXXXXXXXXXXXX**

- XXXXXXXXXXXXXXXX
- XXXXXXXXXXXXXXXX
- XXXXXXXXXXXXXXXX
- XXXXXXXXXXXXXXXX is calculated as well.
- Do not XXXXXXXXXXXXXXXX

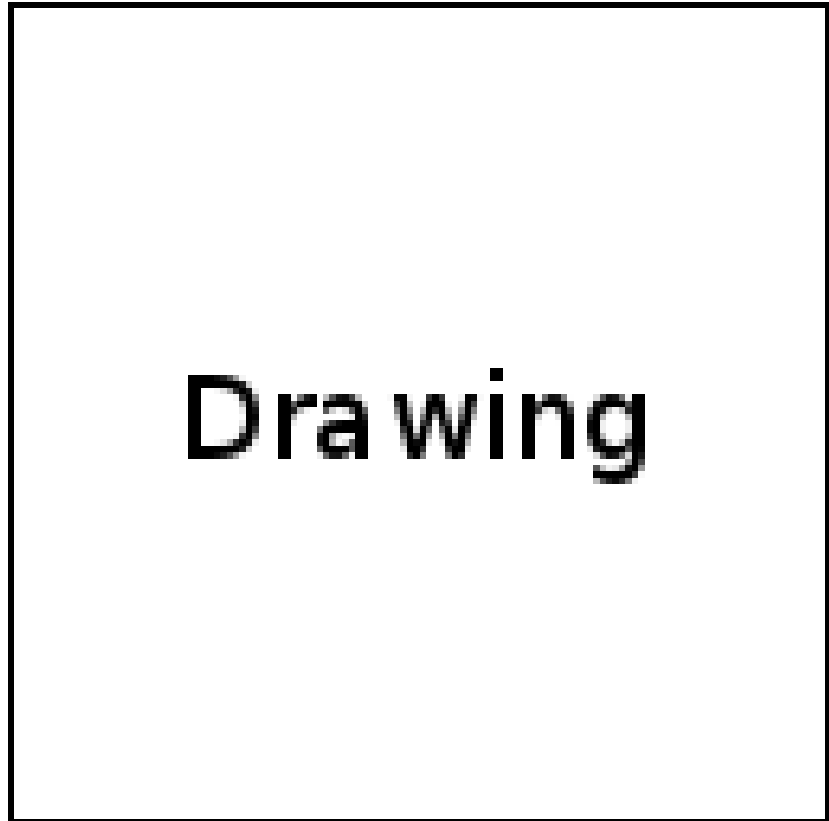
### 4.A.3 Get the 2<sup>nd</sup> batch of material and tools

Item	1st choice	2nd choice	Unusable	Source
XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	
XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	
XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX XXXXX

## 4.B Build

### 4.B.1 Exploded view drawing

1-9	XXXXXXXXXXXXXXXXX X
1	XXXXX
2	XXXX
3	XXXXXXXXXX
4	XXXXXXXXXXXXXXXXXX
5	XXXXXXXXXXXXXXXXXX XX
6	XXXXXXXXXXXX
7	XXXX
8	XXXXXXXXXXXXXXXXXX XX
9	XXXXXXXXXXXXXXXXXX
10-15	XXXXXXXXXXXXXXXXX X
10	XXXXXX
11	XXXXXXXXXXXXXXXXXX XX
12	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
13	XXXXXXXXXXXXXXXXXX XX
14	XXXXXXXXXXXXXXXXXX
15	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX







- XXX
- XXX
- f) XXXXXXXXXXXXXXXXXXXXXXX

**4.B.2.1.4 XXXXXXXXXXXXXXX**

- a) XXX  
XX  
XX
- b) XXX  
XX  
XX
- c) XXX  
XXXXXXXXXXXXXXXXXXXX
- d) XXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- e) XXX  
XXXXXXXXXXXXXXXXXXXX
- f) XXX
- g) XXX
  - XXXXXXXXXXXXXXXXXXXXXXX
  - XXX
  - XXX
  - XXX  
XX
  - XXX  
XX  
XXXXX
  - XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  - XXX  
XXXXXXXXXXXX
  - XXX  
XX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  - XXX  
XX  
XXXX
- h) XXX
- i) XXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXX
- j) XXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXX
- k) XXX  
XX  
XX



XXXXXXXXXXXXXXXXXXXX

l) XXX

m) XXX

**4.B.2.1.5 XXXXXXXXXXXXXXX**

a) XXX  
XX

**4.B.2.2 Make XXXXXXXXXXXXXXX**

**4.B.2.2.1 XXXXXXXXX**

a) XXX  
XX  
XX  
XXX

b) XXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

c) XXX

d) XXX  
XXXXXXXXXXXXXXXX

**4.B.2.2.2 XXXXXXXXX**

a) XXX  
XX

b) XXX  
XX  
XX

c) XXX

d) XXX  
XX  
XXXXXXXXXXXX

e) XXX  
XXXXX

**4.B.2.3 Assemble XXXXXXXXXXXXXXX**



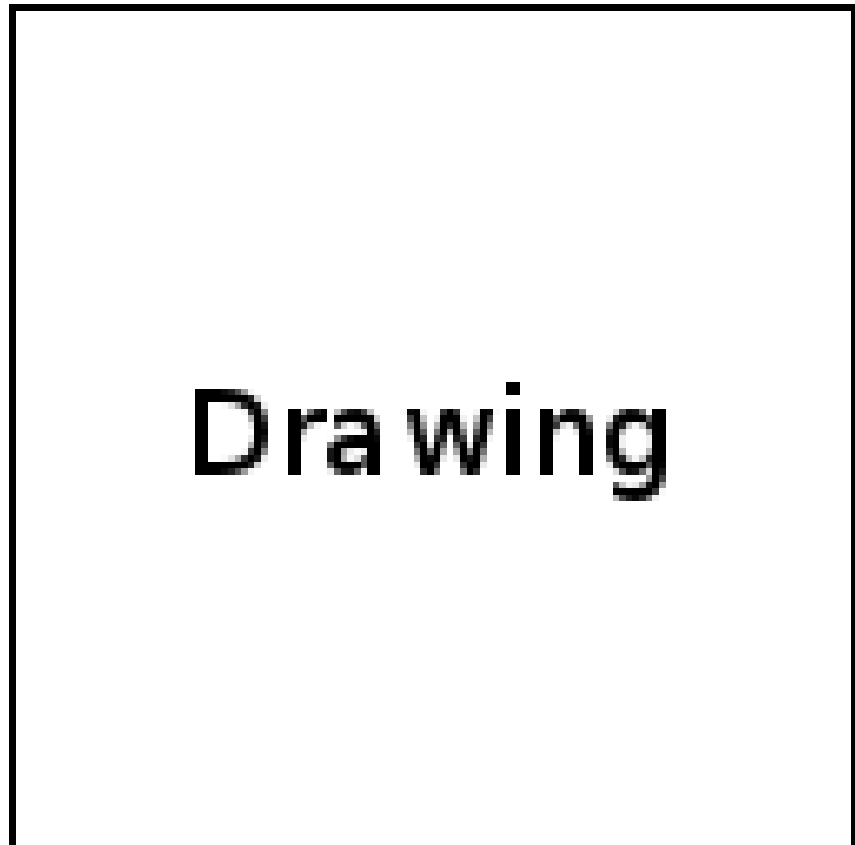




## 5 Operating instructions

### 5.A Exploded view drawing

1-9	XXXXXXXXXXXXXXXXX X
1	XXXXX
2	XXXX
3	XXXXXXXXXX
4	XXXXXXXXXXXXXXXXXX
5	XXXXXXXXXXXXXXXXXX XX
6	XXXXXXXXXX
7	XXXX
8	XXXXXXXXXXXXXXXXXX XX
9	XXXXXXXXXXXXXXXXXX
10-15	XXXXXXXXXXXXXXXXX X
10	XXXXXX
11	XXXXXXXXXXXXXXXXXX XX
12	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX
13	XXXXXXXXXXXXXXXXXX XX
14	XXXXXXXXXXXXXXXXXX
15	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXX



### 5.B Drinking soft water safely

Distillcooker produces distilled drinking water, which is soft. The water minerals of health significance are calcium, magnesium and fluoride. Drinking only distilled water robs you typically of 9% daily calcium and 7% magnesium.

The same is with water purifiers with ion exchange or reverse osmosis.

The cheapest way to replace lost calcium is to add 1/20 of ground dried egg shell into cooking every day.

The cheapest way to replace lost magnesium in developed world (Switzerland) is mineral supplement tablets (28 mg per day). Usual tablet size is 200-400 mg, you need just about 1/10 of that. Second cheapest are then peanuts (22 pcs. per day).

The cheapest way to replace magnesium in a developing country (Cambodia) are bananas (½ banana per day) tightly followed by peanuts (22 pcs. per day).

The actual numbers may vary depending on how hard water you have been drinking instead of distilled one.

Fluoride, natural or artificial, is in drinking water only in some parts of the world, and is controversial. The purpose is to prevent tooth decay. When drinking distilled water, we recommend using a toothpaste with fluoride (most of them have).

See the tables below to check your daily intake of calcium and magnesium:

<b>Age</b>	<b>Calcium Intake sufficient for 95% population</b>	<b>Magnesium Intake sufficient for 95% population</b>
0 – ½ year	200 mg	30 mg
½ – 1 year	260 mg	75 mg
1 – 3 years	700 mg	80 mg
3 – 8 years	1'000 mg	130 mg
8 – 13 years	1'300 mg	240 mg
14 and more years	1'200 mg	400 mg

<b>Food</b>	<b>Serving</b>	<b>Serving size</b>	<b>Servings I eat daily</b>	<b>Calcium per serving</b>	<b>Calcium I eat daily</b>	<b>Magnesium per serving</b>	<b>Magnesium I eat daily</b>	<b>Calcium per 100 g</b>	<b>Magnesium per 100 g</b>
Apple	Piece	182 g		x 11 mg =		x 9 mg =		6 mg	5 mg
Banana	Piece	180 g		x 9 mg =		x 49 mg =		5 mg	27 mg
Beans, baked, canned	Cup	254 g		x 86 mg =		x 69 mg =		34 mg	27 mg
Beef	Steak	305 g		x 15 mg =		x 73 mg =		5 mg	24 mg
Bread, white wheat	Slice	28 g		x 33 mg =		x 7 mg =		119 mg	26 mg
Bread, whole wheat	Slice	32 g		x 52 mg =		x 24 mg =		161 mg	75 mg
Broccoli	Stalk	151 g		x 71 mg =		x 32 mg =		47 mg	21 mg
Carrot	Piece	61 g		x 20 mg =		x 7 mg =		33 mg	12 mg
Cashew nuts	Cup	137 g		x 62 mg =		x 356 mg =		45 mg	260 mg

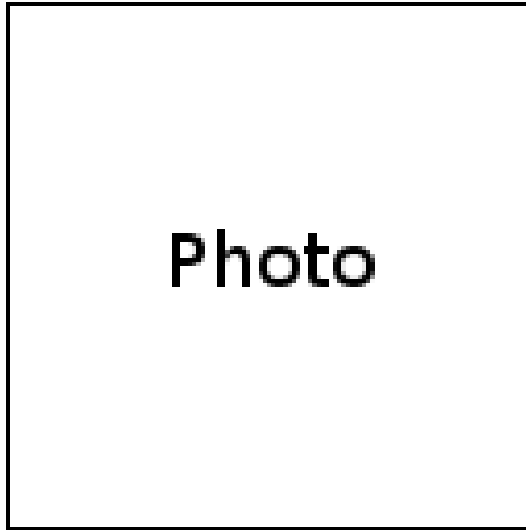
Food	Serving	Serving size	Servings I eat daily	Calcium per serving	Calcium I eat daily	Magnesium per serving	Magnesium I eat daily	Calcium per 100 g	Magnesium per 100 g
Chicken Breast fried	Breast	86 g		x 14 mg =		x 27 mg =		16 mg	31 mg
Chinese Cabbage	Cup	70 g		x 74 mg =		x 13 mg =		105 mg	19 mg
Cottage cheese	Cup	210 g		x 174 mg =		x 17 mg =		83 mg	8 mg
Egg shell, dry	From 1 egg	6 g		x 2'090 mg =		x 17 mg =		38'000 mg	300 mg
Hard cheese	Slice	26 g		x 187 mg =		x 7 mg =		721 mg	28 mg
Ice cream	½ cup	66 g		x 84 mg =		x 9 mg =		128 mg	14 mg
Milk	Glass	244 g		x 305 mg =		x 27 mg =		125 mg	11 mg
Mozzarella	Cup	112 g		x 566 mg =		x 22 mg =		505 mg	20 mg
Oats, breakfast, dry	Cup	81 g		x 42 mg =		x 112 mg =		52 mg	138 mg
Orange juice	Cup	248 g		x 27 mg =		x 27 mg =		11 mg	11 mg
Papaya	Cup	145 g		x 29 mg =		x 30 mg =		20 mg	21 mg
Peanuts, roasted	Cup	144 g		x 88 mg =		x 253 mg =		61 mg	176 mg
Pork, roasted	Portion	200 g		x 12 mg =		x 58 mg =		6 mg	29 mg
Potatoes, boiled without skin	Portion	180 g		x 49 mg =		x 32 mg =		27 mg	18 mg

Food	Serving	Serving size	Servings I eat daily	Calcium per serving	Calcium I eat daily	Magnesium per serving	Magnesium I eat daily	Calcium per 100 g	Magnesium per 100 g
Rice, brown, cooked	Cup	195 g		x 20 mg =		x 84 mg =		10 mg	43 mg
Rice, white, cooked	Cup	158 g		x 30 mg =		x 14 mg =		19 mg	9 mg
Salmon	Fillet	159 g		x 11 mg =		x 43 mg =		7 mg	27 mg
Sardines canned with bones	Can	92 g		x 351 mg =		x 36 mg =		382 mg	39 mg
Spinach, boiled	Cup	180 g		x 245 mg =		x 157 mg =		136 mg	87 mg
Tofu	Slice	84 g		x 26 mg =		x 23 mg =		31 mg	27 mg
Tomato puree	Cup	250 g		x 45 mg =		x 58 mg =		18 mg	23 mg
Yogurt	Cup	180 g		x 304 mg =		x 29 mg =		169 mg	16 mg
Water, ground	Daily	3'200 g		x 154 mg =		x 38 mg =		4.8 mg	1.2 mg
Water, spring	Daily	3'200 g		x 19 mg =		x 10 mg =		0.6 mg	0.3 mg
Water, surface	Daily	3'200 g		x 115 mg =		x 26 mg =		3.6 mg	0.8 mg
				<b>TOTAL Calcium:</b>		<b>TOTAL Mg:</b>			

Source: USDA Nutrient Database and The mineral composition of water and its contribution to calcium and magnesium intake, Choon Nam Ong, A.C. Grandjean and R.P. Heaney



5.C XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX



5.C.1 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

- a) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  - b) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  - c) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- |                       |                 |                          |                  |
|-----------------------|-----------------|--------------------------|------------------|
| XXXXXXXXXXXX<br>XXXXX | XXXXXX<br>XXXXX | XXXXXXXXXXXX<br>XXXXXXXX | XXXXXXXX<br>XXXX |
| XXXXXXXXXXXX<br>XXX   | XXXXXX<br>XX    | XXXXXXXX                 | XXXXXX           |
- d) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  - e) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

5.C.2 Finding raw water

- Less smell is an advantage
- Clear, less muddy is an advantage
- Flowing better than still
- Water must not foam (dishwashing liquid etc.)
- Do not take water from surface 1 cm

5.C.3 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

- a) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- b) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- c) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- d) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX











- e) XXX  
XX  
XXXXXXXXXXXX
- f) XXX

**5.D.7 Refilling XXXXXXXXXXXXXXXXXXXX**

- a) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- b) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XX
- c) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- d) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XX  
XX  
XX  
XX
- e) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXX
- f) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- g) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XX  
XXXX
- h) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX



**5.D.8 General instructions for cooking in XXXXXXXXXXXXXXXXXXXX**

- XXX
- XXX  
XX  
XX  
XXXXXXXXXXXX
- XXX  
XX
- XXX  
XX  
XX
- XXX  
XX

**5.D.8.1 XXXXXXXXXXXXXXXXXXXX**

- XXX  
XX
- XXX
- XXX  
XX  
XXXXXXXXXXXX
- XXX  
XX  
XX

**5.D.8.2 Safety mechanism against XXXXXXXXXXXXXXXXXXXX**

- XXX  
XX

- XX  
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- XXX  
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  - XXX  
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

### 5.D.9 Heating food up

- a) Put food into the cooking compartment (2) and cover with the lid (1).
- b) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- c) Observe "General instructions for cooking" (5.D.8 page 47).
- d) Stirring occasionally will speed up the heating up, but is optional.
- e) When desired temperature is reached, stop.
- f) You may forget the food inside indefinitely. Nothing will happen. It will be just kept at 9X °C.

### 5.D.10 Cooking

- a) Put food into the cooking compartment
- b) If you want, cover with the lid (1).
- c) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- d) Observe "General instructions for cooking" (5.D.8 page 47).
- e) You may forget the food inside indefinitely. Nothing will happen. It will not burn. It will not boil over. It will be just kept at 9X °C.

### 5.D.11 Boiling down liquids

- a) Boil down the liquid vigorously in a normal pot as long as you can without risk of burning at the bottom.
- b) Transfer into Distillcooker cooking compartment, leave open.
- c) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- d) Observe "General instructions for cooking" (5.D.8 page 47).
- e) To speed up, you may direct a fan at the cooking compartment. However, dust may catch in the liquid.
- f) If a solid crust forms on the surface, you have to break it regularly. Otherwise it blocks evaporation.
- g) Stop when its as thick as you like.

### 5.D.12 Melting

- a) Put the stuff to melt into the cooking compartment (2) and close it with the lid (1). It may be frozen or not.
- b) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- c) Observe "General instructions for cooking" (5.D.8 page 47).
- d) Stirring occasionally will speed it up, but is optional.
- e) Stop when its all melted.
- f) You may forget the food inside indefinitely. Nothing will happen. It will not burn. It will not boil over. It will be just kept at 9X °C.

### 5.D.13 Drying solids

- a) Put the solid into the cooking compartment (2) and leave open.
- b) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- c) Observe "General instructions for cooking" (5.D.8 page 47).
- d) To speed up, you may direct a fan at the open cooking compartment. However, dust may catch in the solid.



- e) Stirring occasionally may speed up the drying, but is optional.

### 5.D.14 Making emergency drinking water from urine

XX

- a) XXX
- b) XXX
- c) XXX  
XX
- d) XXX
- e) XXX  
XX
- f) XXX  
XX
  - XXX
  - XXX
  - XXX
- g) XXX  
XX
- h) XXX  
XX
- i) XXX
- j) XXX  
XX  
XXXXXX
- k) XXX  
XX  
XX  
XX  
XX
  - XXXXXX
  - XXXXXX
  - XXX
  - XXX  
XX
  - XXXXXXXXXXXXXXX
- l) XXX  
XX
- m) The resulting water may have noticeable sour taste, also slightly metallic. It is caused  
by XXX. It is a harmless food additive. The  
acidity can be reduced by  
XX.

### 5.D.15 Distilling without cooking

#### 5.D.15.1 Fast with **XXXXXXXXXXXXXXXXXXXXXXXXXXXX**

- a) XXX
- b) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- c) XXX
- d) XXX  
 XXXXXXXXXXXXXXXXXXXXXXX
  - I. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  - II. XXX  
 XXXXXXXXXXXXXXXXXXXXXXX
  - III. XXX  
 XXX  
 XXX  
 XXXXXXXXXXX
  - IV. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  - V. XXX  
 XXX
  - VI. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  - VII. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- e) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

#### 5.D.15.2 Slow without **XXXXXXXXXXXXXXXXXXXXXXXXXXXX**

- a) XXX
- b) XXX  
 XXXXXXXXXXXXXXXXXXXXXXX
- c) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- d) XXX
- e) XXX  
 XXX

### 5.D.16 Cleaning

Twibright Pling is recommended (<http://twibright.com> section Physical Products). Otherwise vinegar. Afterwards wash  
 XXX  
 XXXXXXXXXXXXXXX

XX  
 XXX

### 5.E Maintenance

- XXX  
 XXXXXXXXXXXXXXXXXXXXXXX
- XXX  
 XXX  
 XXX  
 XXXXXXXXXXXXXXX



## 7 Warranty certificate

- We guarantee that the Distillcooker is produced according to original Twibright Labs instructions, version from the given date.
- We guarantee freedom from manufacturing mistakes and from defects in material.
- Defects caused by use contrary to official Twibright Labs usage instructions are not covered.

### 7.A Warrantor information

<b>Name:</b>			
<b>Street:</b>		<b>Number:</b>	
<b>City:</b>		<b>Postal code:</b>	
<b>Country:</b>			
<b>Phone:</b>			
<b>e-mail:</b>			
<b>Signature:</b>			

### 7.B Manufacture information

<b>Model name:</b>	Twibright Distillcooker	<b>Developed by:</b>	Twibright Labs, <a href="http://twibright.com">http://twibright.com</a>
<b>Built to instructions from date:</b>		<b>Manufacture date:</b>	
<b>Serial number:</b>			

### 7.C Warranty details

Delete as appropriate:

<b>Date of sale:</b>		<b>Warranty duration:</b>		
Remedy by replacement without sending the product back	Remedy by replacement with sending the product back	Remedy by money refund without sending the product back	Remedy by money refund with sending the product back	Remedy by repair
Defects in Twibright Labs manufacturing instructions covered too	Defects caused by faulty Twibright Labs usage instructions covered too	Warrantor pays postage consumer → warrantor	Warrantor pays postage warrantor → consumer	Consumer decides the type of remedy
<b>Further details:</b>				

## 8 Credits

- Bunna Chhut (ឈុត ប៊ុនហ្គុត), Cambodia: much info about prices, availability of material, and cooking habits in rural and urban Cambodia.



Work	mm:ss
Measure XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	1:44
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	12:39
<b>Total</b>	<b>14:33</b>

**9.A.2.3 XXXXXXXXXXXXXXXX**

Work	mm:ss
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	3:30
XXXXXXXXXXXXXXXXXXXX	0:12
XXXXXXX	0:05
XXXXXXXXXXXX	0:20
XXXXXXXXXXXXXXXXXXXX	0:15
XXXXXXXXXXXX	0:03
XXXXXXXXXXXX	0:25
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	0:13
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	0:05
XXXXXXXXXXXXXXXXXXXX	0:05
XXXXXXXXXXXXXXXXXXXX	4:16
XXXXXXXXXXXXXXXXXXXX	0:32
XXXXXXXXXXXXXXXXXXXX	0:06
XXXXXXXXXXXXXXXXXXXX	2:00
<b>Total</b>	<b>12:07</b>

**9.A.2.4 XXXXXXXXXXXXXXXX**

Work	mm:ss
XXXXXXXXXXXXXXXXXXXX	0:40
XXXXXXXXXXXXXXXXXXXX	0:35
XXXXXXXXXXXXXXXXXXXX	0:50
XXXXXXXXXXXXXXXXXXXX	0:15
<b>Total</b>	<b>2:20</b>

**9.A.2.5 XXXXXXXXXXXXXXXX**

Work	mm:ss
XXXXXXXXXXXXXXXXXXXX	0:10
XXXXXXXXXXXX	0:20
XXXXXXXXXXXXXXXXXXXX	0:03
XXXXXXXXXXXXXXXXXXXX	0:30

Work	mm:ss
XXXXXXXXXXXXXXXXXX	0:03
XXXXXXXXXX	0:30
XXXXXXXXXXXXXXXXXX	0:57
<b>Total</b>	<b>2:33</b>

**9.A.2.6 XXXXXXXXXXXXXXXXXXXXXXXX**

Work	mm:ss
XX	0:20
XXXXXXXXXXXXXXXXXX	0:30
XXXXXXXXXXXXXXXXXXXXXXXXXXXX	2:30
XXXXXXXXXXXXXXXXXXXXXXXXXXXX	0:15
XXXXXXXXXXXXXXXXXXXXXXXXXXXX	0:30
XXXXXXXXXXXX	0:15
XXXXXXXXXXXXXXXXXXXXXXXXXXXX	0:30
XXXXXXXXXXXX	0:12
XXXXXXXXXXXX	0:13
<b>Total</b>	<b>5:15</b>

**9.B XXXXXXXXXXXXXXXX**

**9.B.1 Derivation of XXXXXXXXXXXXXXXXXXXX formulas**

- XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- XXX
- XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
- XXX  
XX  
XX
- XXX  
XX
- XXX
- XXX

**9.B.2 Derivation of XXXXXXXXXXXXXXXX**

XX  
XX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXX

XX  
XX



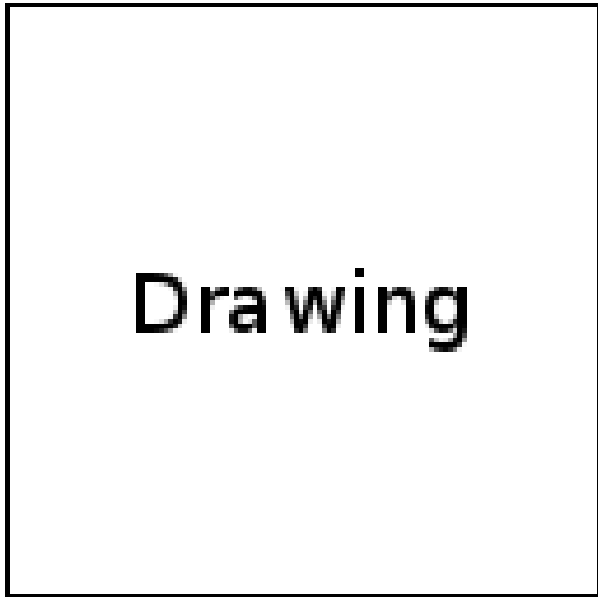
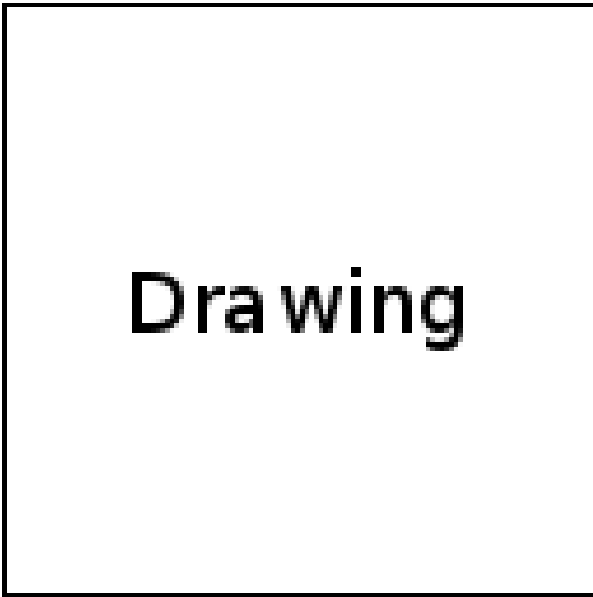
**9.B.3 XXXXXXXXXXXXXXXXXXXX temperature**

XX  
XX

**9.C Derivation of XXXXXXXXXXXXXXXXXXXX**

**9.C.1 XXXXXXXXXXXXXXXXXXXX dimensions etc.**

XX



**9.C.2 XXXXXXXXXXXXXXX**

- XXX  
XX
- XXX
- XXX
- XXX  
XXXX

**9.D Water pollutants removed by Distillcooker**

Only common polutants removed by Distillcooker are listed. They have been checked that they should be removed by Distillcooker.



<b>Pollutant</b>	<b>Effect</b>	<b>Reason for removal</b>
Barium		XX XXXXXXXXXXXXXXXXXXXX
Beryllium		XX XXXXXXXXXXXXXXXXXXXX
Cadmium	cancer	XX XXXXXXXXXXXXXXXXXXXX
Chromium	cancer	XX XXXXXXXXXXXXXXXXXXXX
Copper		XX XXXXXXXXXXXXXXXXXXXX
Lead	toxic, accumulates	XX XXXXXXXXXXXXXXXXXXXX
Nickel	cancer	XX XXXXXXXXXXXXXXXXXXXX
Mercury		XX XX <u>XX</u>
Plutonium	Radioactive, toxic. Cancer.	XX XXXXXXXXXXXXXXXXXXXX
Radium	radioactive	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
Selenium		XX XXXXXXXXXXXXXXXXXXXX
Thallium		XX XXXXXXXXXXXXXXXXXXXX
Uranium	radioactive	XX XXXXXXXXXXXXXXXXXXXX

**9.D.4 Unhealthy anions**

<b>Pollutant</b>	<b>Health effect</b>	<b>Reason for removal</b>
Nitrates	Cancer	XX
Nitrites	Cancer	XX
Cyanide	In high level nerve damage, thyroid problems	XX
Fluoride		XX

**9.D.5 Organic pollutants**

<b>Pollutant</b>	<b>Reason for removal</b>
Alachlor	XX <u>XX</u> <u>XXXXXX</u>

Pollutant	Reason for removal
Benzo(a)pyrene	XX XXX XXXX
Carbofuran	XX XX XXXXX
Chlordane	XX XX XXXXXXX
Dalapon	XX XXX XXXX
2,4-D	XX XX XXXXXXX
di(2-ethylhexyl) adipate	XX XX XXXXXXXXXX
di(2-ethylhexyl) phthalate	XX XXX XXXX
Dinoseb	XX XXX XXXX
Dioxin	XX XX XXXXXXXXXX
Diquat	XX XX XXX
Endothall	XX XX XXX
Endrin	XX XX XXX
Ethylbenzene	XX XX XXX
Ethylene dibromide	XX XX XXX
Glyphosate (Roundup)	XX XX XXX
Heptachlor	XX XX XXX



### 9.D.7 Smells and tastes

Distillcooker removes common occurring bad smells and tastes. These are caused by bacteria or algae and are mostly harmless. To some human is sensitive in the range of parts in a trillion!

### 9.E Water production rate

Food	Distilled water
<b>Cambodia</b>	
200 g rice+500 g water	0.0X L
2 L tea	0.3X L
1.5 L soup simmered open for 20 min	0.3X L
0.75 L soup reheated	0.0X L
2 L simmering water for bathing	0.2X L
Boil over 2 L water for drinking	0.2X L
Reheat 500 g of food	0.0X L
<b>Total</b>	<b>1.3X L</b>
<b>Switzerland</b>	
100 g rice+150 g water	0.0X L
2 L tea	0.3X L
0.6 L soup simmered open for 1 h	0.4X L
Reheat 600 g of food	0.0X L
Boil down 410 mL of fruit juice to 50 g jam	0.3X L
<b>Total</b>	<b>1.2X L</b>

### 9.F Sources of images

Table column	Image sources
Excellent	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
Excellent XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
Excellent XXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
Very good	XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX
Good	XXXXXXXXXXXXX
Unusable	XXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXX XXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXX